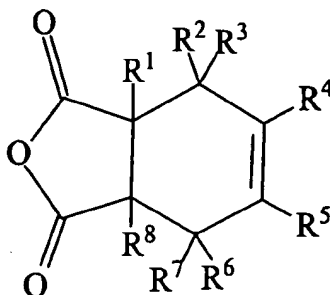


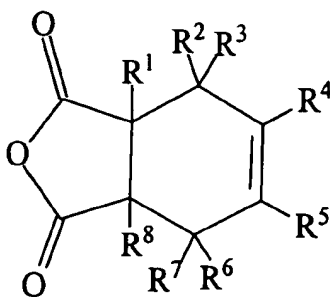
## THE INVENTION CLAIMED:

1. Polyimides having improved thermal-oxidative stability derived from the polymerization of effective amounts of at least one polyamine, at least one  
 5 tetracarboxylic dianhydride and a dicarboxylic endcap having a formula:



- wherein  $R^1$  is selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals where R is selected  
 10 from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons; and wherein  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbon  
 15 atoms.

2. Polyimides having improved thermal-oxidative stability derived from the polymerization of effective amounts of at least one polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having a formula:



wherein  $R^2$  and  $R^3$  are the same or different radicals selected from the group consisting of alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons; and wherein,  $R^1$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ ,  $R^8$  are the same or  
5 different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons.

10           3.     The polyimide of Claim 1 wherein the dicarboxylic endcap is 2,3-dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

          4.     The polyimide of Claim 1 wherein the dicarboxylic endcap is 1,3-dimethyl-1,2,3,6- tetrahydrophthalic anhydride.

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          5.     The polyimide of Claim 1 wherein the dicarboxylic endcap is 3,3-dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

          6.     The polyimides of Claim 1 wherein the polyamine is an aromatic  
20 polyamine.

          7.     The polyimide of Claim 6 wherein the aromatic polyamine is an aromatic diamine.

25           8.     The polyimide of Claim 6 wherein the aromatic polyamine is 4,4'-methylene dianiline.

9. The polyimide of Claim 8 wherein the tetracarboxylic dianhydride is 3,3',4,4'-benzophenonetetracarboxylic dianhydride.

5 10. The polyimide of Claim 9 wherein the dicarboxylic endcap is 2,3-dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

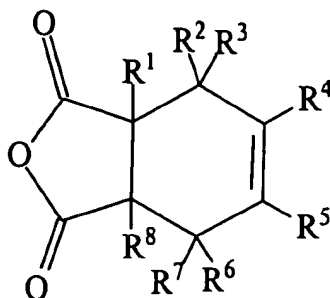
11. The polyimides of Claim 2 wherein the polyamine is 4,4'-methylene dianiline.

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12. The polyimides of Claim 11 wherein the tetracarboxylic dianhydride is 3,3',4,4'-benzophenonetetracarboxylic dianhydride.

13. The polyimides of Claim 12 wherein the dicarboxylic endcap is 2,3-  
15 dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

14. The process of preparing polyimides having improved thermal-oxidative stability derived from the polymerization of effective amounts of at least one aromatic polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having a  
20 formula:



wherein R<sup>1</sup> is a radical selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is  
 5 selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons; and wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons.

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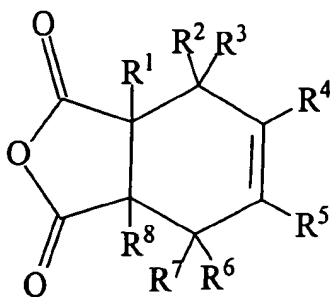
15. The process of Claim 14 wherein the aromatic polyamine is 4,4'-methylene dianiline.

16. The process of Claim 15 wherein the tetracarboxylic dianhydride is 3,3',4,4'-  
 15 benzophenonetetracarboxylic dianhydride.

17. The process of Claim 16 wherein the dicarboxylic endcap is 2,3-dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

18. The process of Claim 14 wherein  $R^2$  and  $R^3$  are the same or different radicals selected from the group consisting of alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals where R is selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons, and wherein  $R^1$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ ,  $R^8$ , are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals where R is selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons.

19. Fiber-reinforced high-temperature polyimide matrix composites comprising a fibrous material impregnated with an effective amount of a polyimide having improved thermal-oxidative stability; said polyimide derived from the polymerization of at least one polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having the formula:



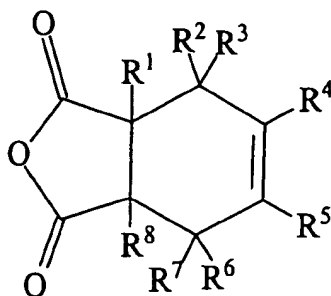
wherein  $R^1$  is selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons; and wherein  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R,  $SO_3R$ ,  $PO_4R$ , F and Cl radicals, where R is selected from

the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbon atoms.

20. The composites of Claim 19 wherein the fibrous material comprises  
5 carbon fibers.

21. The composites of Claim 19 wherein the fibrous materials comprises  
glass fibers.

10 22. A process of preparing a fiber-reinforced prepreg which comprises  
impregnating a fibrous material with an effective amount of a polyimide prepolymer  
derived from at least one polyamine, at least one tetracarboxylic dianhydride and a  
dicarboxylic endcap having the formula:



15 wherein R<sup>1</sup> is selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl,  
OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected  
from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6  
carbons; and wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are the same or different radicals  
selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR,  
20 carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals, where R is selected from  
the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbon  
atoms.

23. The prepreg obtained by the process of Claim 22.

